A Low Cost, Electronically Scanned Array (ESA) Antenna Technology for Aviation Hazard Detection and Avoidance, Phase II

Completed Technology Project (2009 - 2010)

Project Introduction

The proposed Phase II project includes the design, fabrication, and testing of a fully-functional 320 element X-band antenna which will serve dual-roles as both the proof-of-design (POD) and the proof-of-manufacturability (POM) prototype of ThinKom's innovative low-cost electronically scanned array (ESA) antenna technology. Simultaneously emphasizing affordability and performance, this antenna subsystem will uniquely enable near-term wide deployment of airborne hazard detection and avoidance radar systems with greatly enhanced performance and functionality relative to currently fielded systems. This technology comprises a proprietary integrated "quasi-monolithic" feed/phase-shifter/radiator topology exclusively realized using low-risk low-cost flight-proven, manufacturing materials, components, and processes. In addition, this architecture is ideally-suited for simplified compact integration with a highly reliable, low-cost, low-power consumption beam steering controller (BSC) utilizing pre-existing COTS components. The expected RF loss through the feed, phase shifter, and radiator of this low-cost/high-performance topology is less than 1 dB at X-Band, which is no greater than (and in most cases less than) that of "traditional" (much) higher cost ESA implementations. Building upon the Phase I preliminary antenna subsystem design and highly successful phase-shifter risk-reduction verification testing accomplished in Phase I, the Phase II program will directly demonstrate and prove both the performance and revolutionary cost reduction potential of this new "no compromise" ESA architecture and technology. In addition to the targeted aviation hazard detection radar/sensor application, other benefiting applications would include ground mapping, atmospheric studies, and launch range surveillance radars and sensors as well as communication applications for which an agile highly directional beam is required such as high-gain LOS and NLOS (SATCOM) Data Links.

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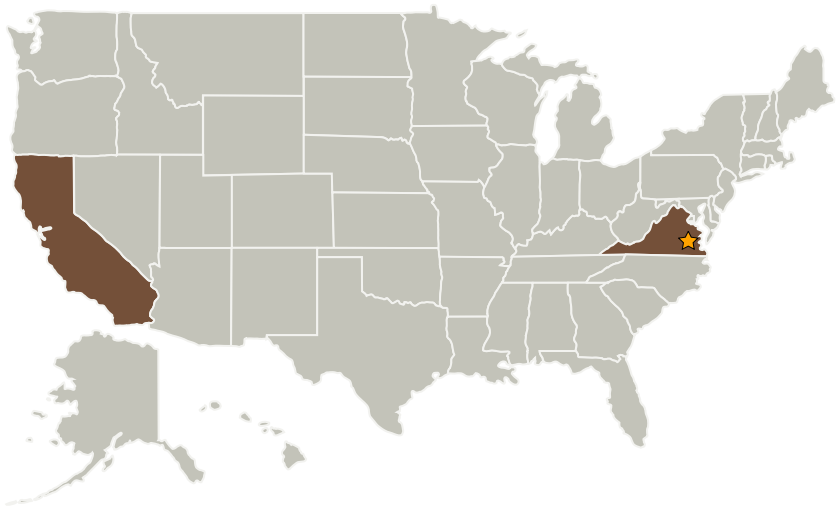
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Langley Research Center(LaRC)	Lead Organization	NASA Center	Hampton, Virginia
ThinKom Solutions, Inc.	Supporting Organization	Industry	Torrance, California

Primary U.S. Work Locations	
California	Virginia

Project Transitions

February 2009: Project Start

May 2010: Closed out

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Langley Research Center (LaRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.2 Radio Frequency
    - TX05.2.6 Innovative Antennas